

**Research Status Report**  
T1803-8 ITS Backbone Infrastructure

**ITS Backbone Infrastructure**

by

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# A BRIEF REPORT ON 2001 ACTIVITIES FOR THE ITS BACKBONE

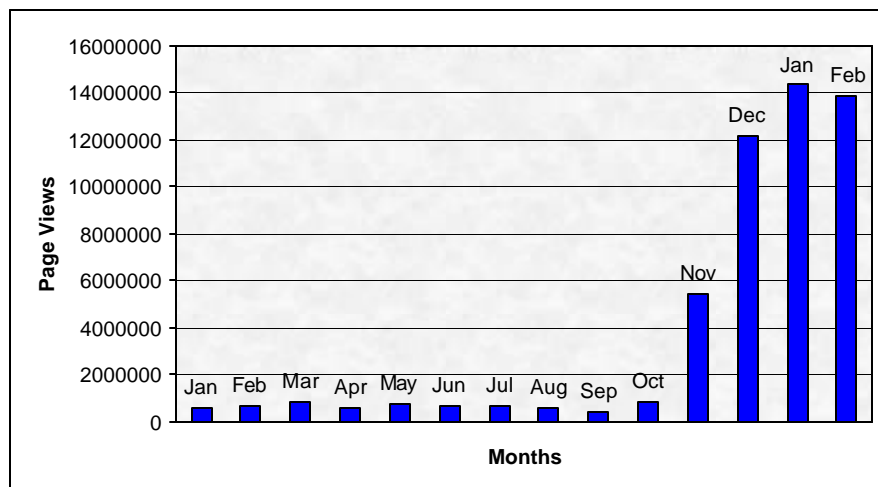
The ITS Backbone performs several important tasks for the ongoing efforts at WSDOT and UW. The Backbone: (1) supports existing traveler information applications for both traffic and transit information, (2) supports real time access to WSDOT data for a variety of public and private groups, (3) off-loads the interaction and support of data users external to WSDOT, (4) provides a standard interface so that all roadway data are available equally to outside agencies/groups, (5) supports research activities within WSDOT, research funded by WSDOT at the UW, and research at universities and agencies nation wide, and (6) provides a standard interface to include new data sources into the existing TMS System. We detail each of these contributions with supporting statistics. Any usage by the developers at the UW has been removed from these statistics.

## 1. Traveler Information Applications

The existing suite of traveler information applications that require the use of the ITS Backbone include both transit and traffic modules.

### *1.1 Transit Applications:*

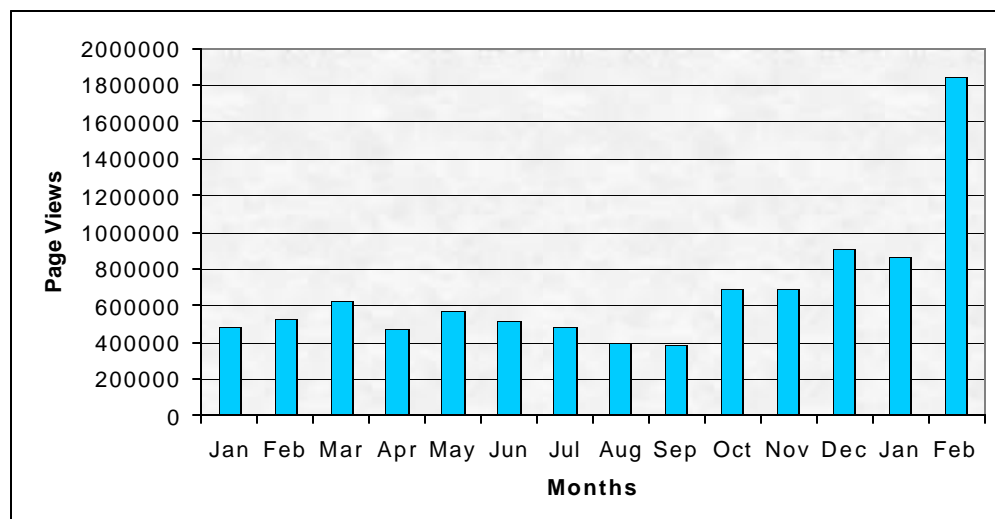
**MyBus:** There have been 24,152,191 uses over the last 12 months, with over twelve



million in December 2001, and the usage has an increasing trend as shown in Figure 1.

**Figure 1: MyBus total page views, January 2001 through February 2002.**

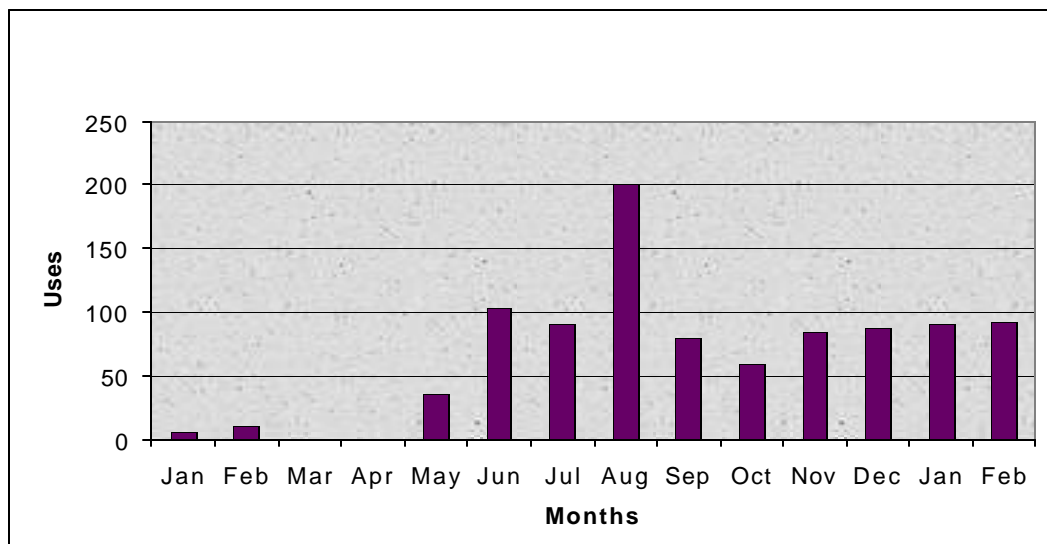
These uses were from over 19,000 distinct client addresses, including the largest user, Microsoft. The biggest users are the largest regional employers, Microsoft, Boeing, and the University of Washington. The effect of removing the Microsoft numbers from the page views is



shown in Figure 2.

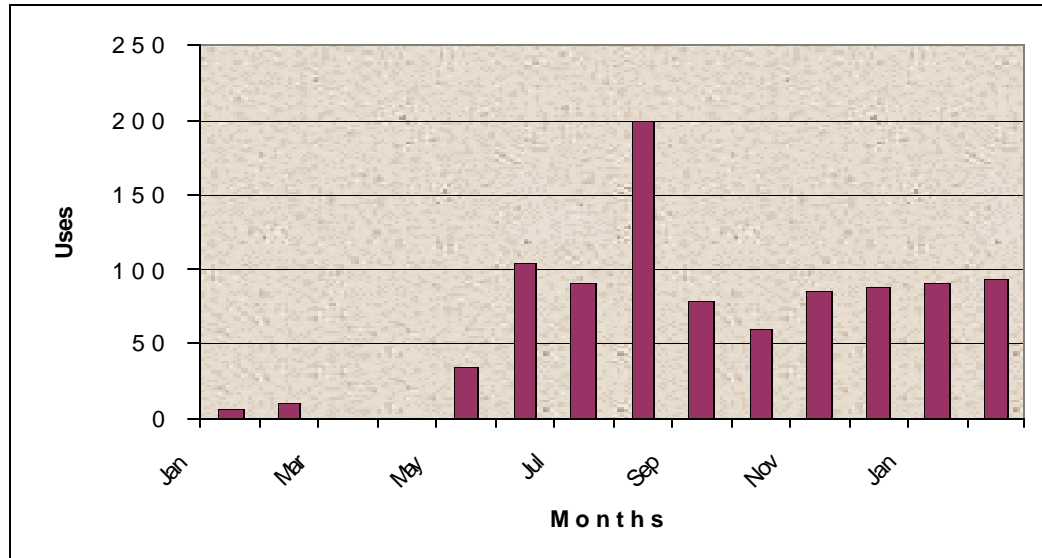
**Figure 2: MyBus usage with Microsoft numbers removed.**

In addition to the web site, there is the MyBus WAP phone site with usage of about 3,500 per month and increasing in number, as shown in Figure 3.



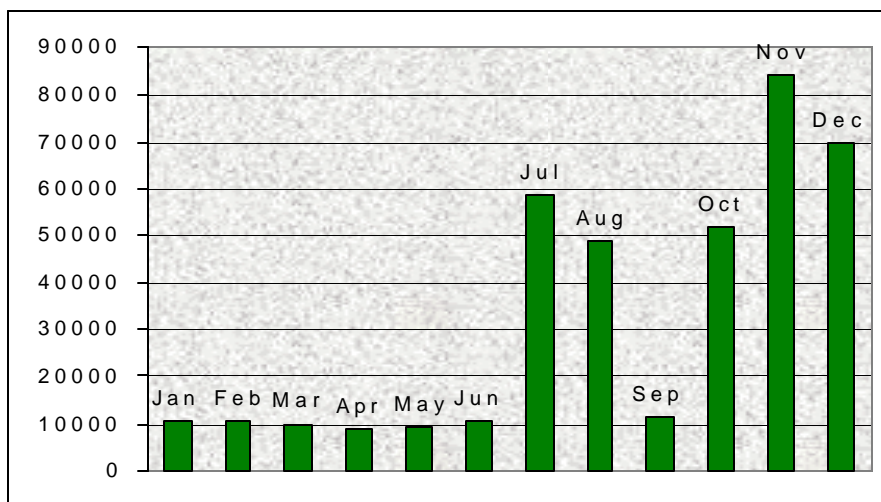
**Figure 3: MyBus WAP phone site usage beginning January 2001.**

The newest deployment is MyBus for the PALM PDA which has seen relatively small usage to date, as shown in Figure 4.



**Figure 4: MyBus Palm usage beginning January 2001.**

**Busview:** During 2001 there were 384,141 connections to the data stream that indicated an individual use. Presently, there is a stable usage of around 10,000 per month but with spikes as high as 84,000 in November. These uses originate from over 33,000 distinct client addresses.



**Figure 5: Busview data stream usage for 2001.**

**Transit Watch:** This application has been displayed to thousands of users at both Northgate and Bellevue Transit Centers. All new Sound Transit funded facilities include plans to use Transit Watch.

### ***1.2 Traffic applications:***

**Trafnet:** This application provides speed and travel times and was used 3,743 times from 545 unique hosts.

**Traffic Channel:** This program is available on UWTV 2 from 1 a.m. - 8:30 a.m., Noon - 2:30 p.m., and 3:30 p.m. - 10:00 p.m. in 200,000 households throughout King County. It is also available on channel 9400 of the Dish 500 Network.

**TDAD:** A datamine which was used 1,689 times by 96 different client addresses that include the domains shown in Table 1.

**Table 1: Domains that have Downloaded TDAD Data**

accessone.com atl1.da.uu.net capnet.state.tx city.oshawa.on consultec-llc.com daimlerChrysler.COM dot.state.oh ed.ornl.gov eng.uci.edu extranet.oleane.net frisco.ch2m.com grta.org guidant.com mcis.washington.edu mitretek.org netexpress.net ntu.edu.sg open.org plstn1.sfba.home rsandh.com sclfw.guidant.com seattle-16-17rs.wa.dial-access sttl1.wa.home tnt1.olympia.wa tnt4.sjc4.da	adobe.com benchmark.com ce.washington.edu clientes.euskaltel.es coventry.ac.uk deainc.com dsl.gtei.net ee.washington.edu erg.sri.com fhwa.dot.gov Fsmodem.washington.edu gte17.rb1.bel ix.netcom.com metapath.com mtq.gouv.qc niatt.uidaho.edu odetics.com ornl.gov r10.d.bel s140.tnt2.nyw sea.lightrealm.net sfba.home.com sys.Virginia.EDU tnt16.redmond.wa trac.washington.edu	andrew.eng.uci.edu boeing.com ch2m.com co.clark.wa cpsrta.org dhcp.pdx.edu ecom.unimelb.edu eecs.umich.edu etak.com forthnet.gr gen.cadvision.com gtei.net korea.ac.kr microsoft.com netcom.com northgrum.com olympia.wa.da.uu.net oscsystems.com ricochet.net saturn.bbn.com seanet.com spmodem.washington.edu tamu.edu tnt2.atl1.da trapsoft.com
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## 2. Real-Time Data Access

Groups external to WSDOT access data through the Self-Describing Data (SDD) interface. When the SDD software library is downloaded, we request that the user voluntarily provide an affiliation. The unique responses received during 2002 include those shown in Table 2.

**Table 2: Voluntary Affiliation Identification**

"Meyer, Mohaddes Associatiates" @home Airsys ATM Bell Business Systems Enginee Cheil Eng. Co. Cybermetrie EPP Gannett Fleming Inc Infomove Integrated Data Communication Karkalis Kong Market Machines Corp Mobility Technologies N/A Neurosoft Openet Telecom PT. Blom Nusantara RIA Self TANN Telemart Traffic.com UMM UW Univ of Texas @ San Anto VHB Wavetronix azure@hotmail city of Bellevue h infospace n/a (interested bystander) satya inc	"Software Center, Motorol"  ASL Design Anderson & Associates BlackBox CF Patton Middle School City of Bellevue DCM Technologies Esgem Limited Günther Pichler G.m.b.H. Infomove.com Iteris Inc. King County MELT Microsoft MobilityWerks NA NiX P.S.U. Personal RMCS Shell TRAFTOOLs Telia TrafficStation UNO UW CSE University of California ViAir Westel International Ltd bluemartini computran hokuto ele insoft navigation technologies sergioolivas.com	Intec  AT&T Atlas Software Tech Inc Blank Inc. Cheil Eng. Combix Corporation Dynamic FSAG Home Ingeniux Juxtapoz Design Kivera Mark Atwood MillerCentral Morgan State University NT None PB Farradyne Quantex Satyam Smartworks Ltd Tegic Communications Trac U.P.B. USC UW Computer Science University of Washington Virtuoso ZDiK cairo univercity diasoft iii mis none shenkar college
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somani engineering ind tongji unemployed	teleatlas tpso university of washington	thabone unaffiliated viathan corp.
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Automatic Vehicle Location (AVL) using SDD provided data to 9,921 connections from 144 client addresses.

In 2001 alone, the Transportation Management System (TMS) data made available through the SDD framework had 427,362 connections for data from external requestors made from 81 client addresses. Example groups that have developed applications that use this data continuously include: traffic.tann.net, traffic.iteris.com, infomove.com, wavetronix.com, research.att.com, trafficstation.com, odetics.com, navtech.com, and viair.com.

### **3. External Support of Data**

Because external data requests are supported by the ITS backbone, WSDOT engineers do not need to service these external customers. The backbone has serviced thousands of requests for data from hundreds of sites (see the statistics for AVL and TMS as well as TDAD data above). When averaged out, this represents a new client every 1.5 days. In particular, Traffic.com and Wavetronics have interacted quite a bit with the Backbone staff.

### **4. Provide a Standard Interface**

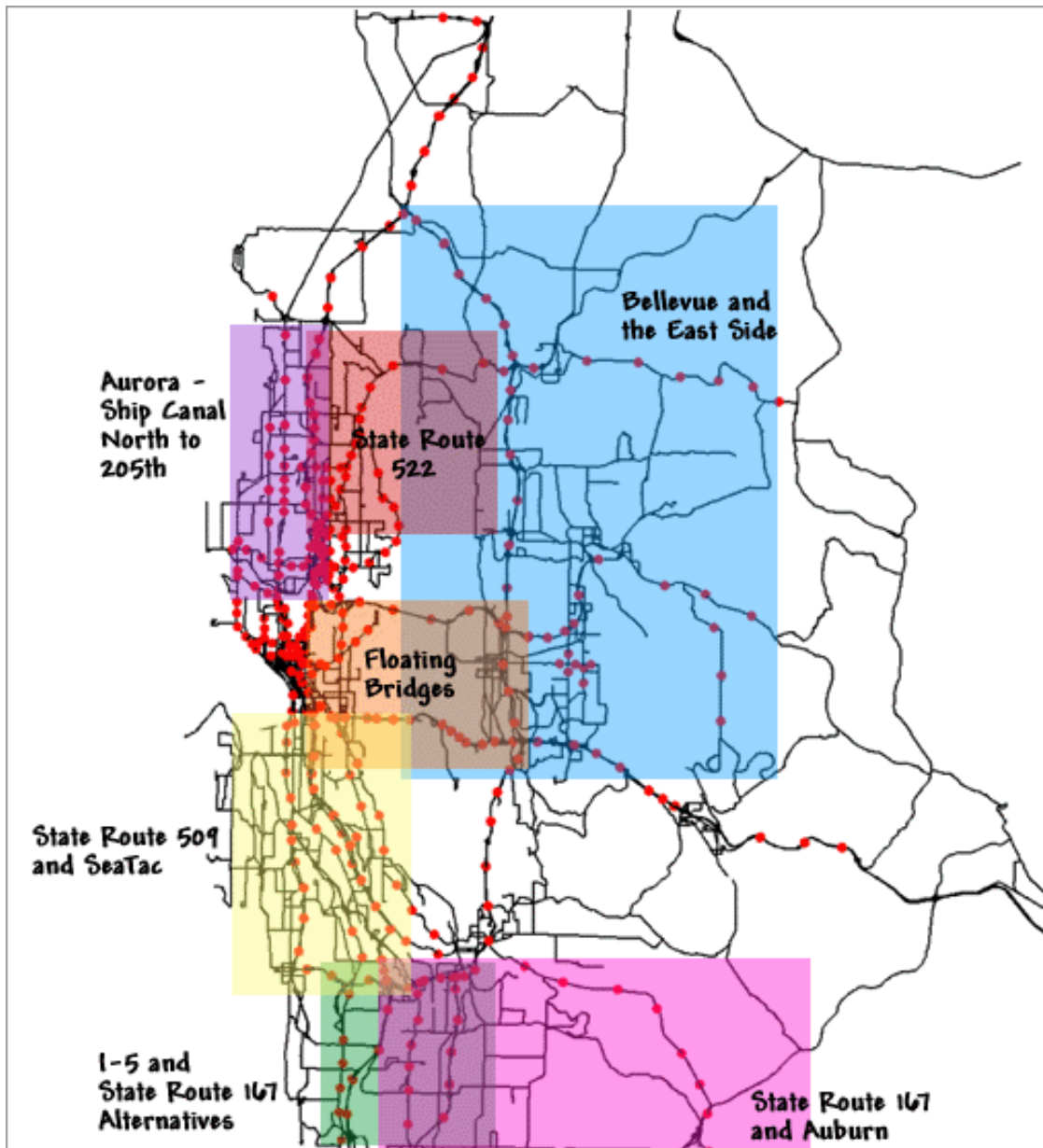
The Backbone provides a level playing field for external data users so that WSDOT provides comprehensive data sets equally to any external concerns, public or private.

### **5. Support Research**

TDAD is used extensively by both external and WSDOT addresses. A variety of students and faculty at the UW who have WSDOT funding have used the Backbone and TDAD for WSDOT funded projects. A presently funded project to use transit vehicles as probes will make speed data from freeways and arterials available on the backbone for use in traveler information and traffic management. A prototype map of real speed data is shown in Figure 6. This new, virtual sensor will provide speeds throughout King County without installing additional



loops and is an example of the Backbone obtaining data from an external agency, performing



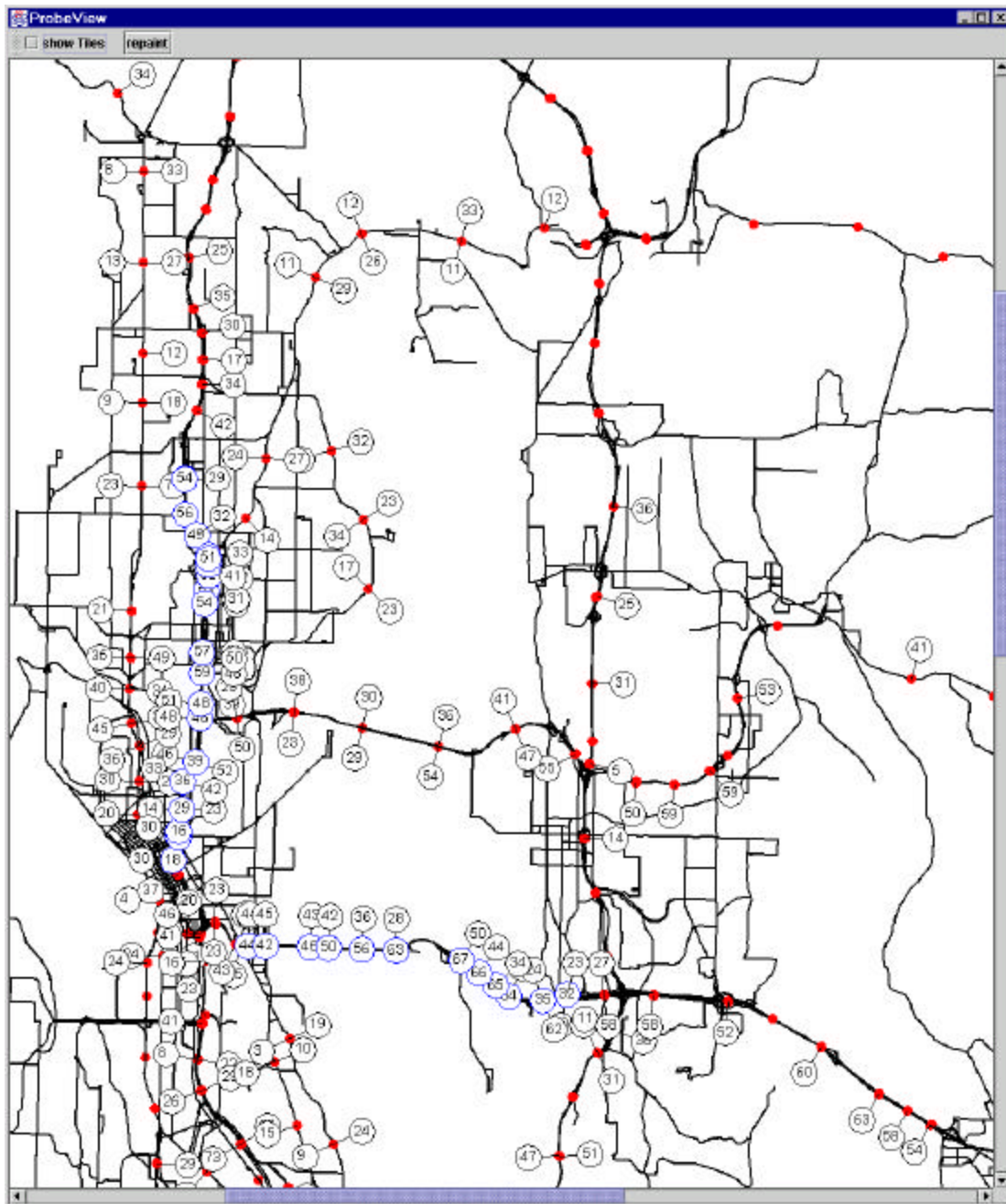
data fusion and estimation, and producing virtual sensors for internal use by WSDOT

**Figure 6: Prototype map of real speed data.**

## **6. Include New Data Sources into Existing TMS System**

As part of the Backbone effort, we have created methodologies and software to take SDD stream contents and include them in the Real Time Database used on the TSMC central traffic

management computer systems. This will make several additional sources of data available through the established traffic management software. First, probe data from the Transit Vehicles as Probes research effort will be included for locations selected by TSMC personnel. Second, the data from the traffic systems and along SR522 will be inserted into the existing TMS. The framework created to include these new data sources is designed to be sufficiently flexible to allow for other, future sources. The Bellevue traffic management office plans on providing data to the TMS using the interfaces developed for the ITS backbone.



**Figure 7: Virtual speed sensors on the ITS Backbone.**

## **7. End Users of Developed Products**

1. *Travelers*: Presently in the thousands; potentially tens of thousands.
2. *Transportation-related state organizations using ITS services*: potentially dozens.

3. *Developers of ATIS products, both public and private sector partners:* potentially hundreds.

## **8. WORK ELEMENTS**

1. Maintain hardware and software for existing backbone infrastructure. This addresses the maintenance of the backbone infrastructure resulting from the SmartTrek project.
2. Expand the existing backbone software to meet the needs for NTCIP center-to-center communication.
3. Expand Backbone data services to include probe vehicle information and video speed sensors.
4. Provide a standard interface to allow the existing TMS system at TSMC to include new data sources
5. Provide documentation, example source code, and consulting to allow ISPs access to any of the data flows available on the ITS backbone.
6. Respond to ISP requests for additional services.
7. Interact with evaluator to collect evaluation data.
8. Upgrade communications and computing hardware as necessary. Software security is an ongoing effort for any computers directly connected to the Internet.